

# IDENTIFICATION OF SUPPLY CHAIN OF INPUT AND OUTPUT OF MAJOR VEGETABLES IN DARRANG DISTRICT OF ASSAM (INDIA)

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## ABSTRACT

*The present study was conducted to analyze the supply chain of major vegetables in the Darrang district of Assam. Both input and output supply chains for selected vegetables are studied. Input supply chain and marketing channels were identified. The important vegetables selected were brinjal, bottle gourd, tomato and cabbage for detailed analysis. Two important markets viz., Kharupetia and Besimari were selected and from the surrounding villages of each market from which bulk of products come to the market, three villages were selected randomly. A simple random sample of 20 percent was drawn without replacement from marginal, small, medium and large categories of farmers from the selected villages. The majority of the farmers (72.50 %) preferred their input source as a local dealer. For brinjal six numbers, for bottle gourd five numbers, for tomato six numbers and for cabbage, four numbers of marketing channels were identified. Among the farmers, 27.43 percent of brinjal growers, 32.16 percent of bottle gourd growers and 22.68 percent of tomato growers sold their produce through channel no-5 and 34.1 percent of cabbage growers sold their produce to the wholesaler through channel no-3.*

**KEYWORDS:** Supply Chain, Marketing Channels, Random Sample, Vegetables, Farmers & Traders

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## INTRODUCTION

A vegetable is the designation given to that group of horticultural plants grown for human consumption either for their roots, tubers, shoots, stems, leaves, flower buds, flowers, fruit or seed (immature or mature). In addition to the contribution of valuable nutrients, vegetables, add variety, taste, color, and texture to diets which provides fiber for digestion and to prevent constipation. In the marketing of vegetables, which are perishable in nature, supply chain plays a crucial role. The very nature of landholding by the farmers, varied climate conditions production spread over a worldwide geographical area, mainly in remote villages, diversified consumption patterns, the perishable nature of the produce, high fluctuations in demand and prices and poor supply chain infrastructure make supply chain management for fruits and vegetables more complicated. Where Sudarshanet al. (2013) estimated the post-harvest losses in pomegranate fruit at different stages of the supply chain and developed

appropriate strategies to reduce these losses. Efficient supply chain management in marketing, not only increases the profitability and efficiency of retailers, but also adds value to different stakeholders like farmers, consolidators, and consumers. The study is proposed to identify the prevalent supply chain of vegetables in the Darrang district. The study will be helpful in identifying the best possible supply chains of inputs and outputs which will help the policy makers to draw policies for developing the vegetable subsector in the district.

## METHODOLOGY

This chapter presents a general description of the study area, sampling design, data collection and the methods being used for analysis of data to fulfill the objectives of the study. Darrang district has one subdivision viz., Mangaldai Sadar, having seven development blocks and fourteen revenue circles. The data were collected from the sample households through personal interview method. A Pilot survey was done before conducting the main survey to know the status of vegetable growers in the district. Two important markets viz., Kharupetia and Besimari were selected and from the surrounding villages of each market from which bulk of products comes to the market, three villages were selected randomly. List of vegetable growers were prepared from each selected village and categorized on the basis of operational holdings. On the basis of operational land holdings, farmers from each village were categorized as marginal, small, medium and large. A simple random sample of 20 percent was drawn without replacement from each category of farmers for detail analysis. Necessary data were collected with the help of pretested schedules and questionnaires for fulfilling the objectives of the study. Data collected pertained to the year 2015-16.

### Study Area and Selection of Sample

The present study was carried out in the Darrang district of Assam. Darrang District is situated in between Kamrup and Sonitpur District. A simple random sample of 20 percent was drawn without replacement from each category of farmers for detail analysis. Necessary data were collected with the help of pretested schedules and questionnaires for fulfilling the objectives of the study. Data collected pertained to the year 2015-16. The detailed sampling plan is given below:

**Table 1: Sampling Plan for Selection of Markets and Villages**

Markets	Selected villages	Farmer Categories	Total Sample Drawn
Kharupetia	Thakurpatty	Marginal(50),small(50),medium(15),large(10)	25
	Paniakhata	Marginal(20),small(50),medium(15),large(5)	18
	Gopalnagar	Marginal(50),small(25),medium(10),large(5)	18
Besimari	Besimari	Marginal(50),small(50),medium(25),large(5)	26
	Baruajhar	Marginal(25),small(50),medium(10),large(5)	18
	Dongpara	Marginal(35),small(25),medium(10),large(5)	15
<b>Sub Total</b>			<b>120</b>

## RESULTS

### Input Supply Chain of Major Vegetables

**Table 2: Sources of Input Supply Chain for Vegetable Growers in the Study Area**

Sl. No	Input Source	Farmers Availing the Source							
		Marginal(46)		Small(50)		Medium (17)		Large(7)	
		Frequency	%	Frequency	%	Frequency	%	Frequency	%
1	Local dealer	43	93.47	36	72	5	29.41	3	17.64
2	Distant dealer/supplier	20	43.47	27	54	8	47.05	6	85.71
3	Govt. agency	8	17.39	15	30	13	76.47	5	71.42
4	NGO's	7	15.21	11	22	9	52.94	4	57.14

From the (Table 2), it is observed that among the four groups of farmers, the marginal farmers, mostly preferred local dealer as their input source, i.e. (93.4%) followed by the distant dealer (43.47%) and Govt. agency (17.39%) and small numbers of farmer- preferred their input source as NGOs (15.21%). From the (Table 2), indicated that small farmers, mostly preferred local dealer as their input source; i.e. (72%) followed by the distant dealer (54%) and Govt. agency (30%) and some farmers (22%) preferred NGOs as their input source. The medium farmers, mostly preferred Govt. agency as their input source (76.47%) followed by NGOs (52.94%) and distant dealer (47.05%) and some of the farmers preferred their input source as a local dealer (29.41%). Among the large category of farmers, about 85.71 percent preferred their input source as distant dealers followed by Govt. agency (71.42%) and NGOs (57.14%) and some of the farmers preferred their input source as a local dealer (17.64%). All those points indicated that the generally majority of farmers preferred traditional supply chain Where Anastasiadis *et. al.* (2015) analyzed the interactions of market players at each stage in the agri-food sector throughout the whole chain from production to consumption regarding upgrading the emergent traditional supply chain into new efficient supply chains

Input supply chain has been projected based on, among the four groups of farmer's input source of various vegetable distributions in the study area.

**Table 3: Input Supply Chain of Major Vegetables**

Channels	Input Chain	Percentage of Farmers Adopting the Chain
Channel-1	Local dealer → Farmer	72.50 (120)
Channel-2	Distant dealer → Farmer	50.83 (120)
Channel-3	Govt. agency → Farmer	34.16 (120)
Channel-4	NGOs → Farmer	25.83 (120)

(Table 3), indicated that among the four groups of farmers, the majority of the farmers preferred their input source as local dealer i.e., 72.50 percent followed channel no-1 and 50.83 percent of the farmers followed channel no-2 i.e., distant dealer as the input source. Some of the farmers preferred their input source as Govt. agency i.e. 34.16 percent, a followed channel -3 and 25.83 percent of the farmers preferred NGOs for their input source who followed channel-4.

### Output Supply Chain of Major Vegetables

Output supply chains have been projected in terms of various vegetable distribution channels. The important vegetables selected for detailed study are Brinjal, Bottle gourd, tomato, and Cabbage.

Table 4: Marketing Channels for Brinjal

Channels	Marketing Channels	Average Percentage of Farmers Adopting the Channel
Channel-1	Producer → Consumer	15.92(120)
Channel-2	Producer → VT → consumer	23.89(120)
Channel-3	Producer → WSM → R → consumer	8.84(120)
Channel-4	Producer → VT → LMCA → WSM → R → Consumer	12.38(120)
Channel-5	Producer → VT → WSP → R → consumer	27.43(120)
Channel-6	Producer → LMCA → R → consumer	11.54(120)

**Note:** VT- Village Trader, WSM- Wholesale Market, R- Retailer, LMCA- Local Market Commission Agent.

From the (Table 4), it is observed that 27.43 percent of vegetable growers sold their vegetables through channel no-5 followed by channel no-2 which was adopted by 23.89 percent of farmers. It has been observed that Village Traders play an important role in vegetable marketing in the district (channel no-2, 4 and 5). Most of the farmers growing brinjal preferred village traders as an intermediary because of the facilities like weighing, packing, lifting from farm gate and even financial help received from them by the farmers when they need. Only 8.84 percent and 11.54 percent of the farmers sold their produce through channel-3 and 6 respectively. In channel -6 farmers sold their produce to LMCA and most of the sellers did not know where and how they could reach potential buyers and sellers. Due to the prevailing traditional marketing system in Assam, the producers are not getting actual prices of their agricultural produce, but as compared to channel-3, 4, 6, the channel-1 has more adopters (15.92%) where vegetables are sold directly to the consumer.

Table 5: Marketing Channels for Bottle Gourd

Channels	Marketing Channels	Percentage of Farmers Adopting the Channel
Channel-1	Producer → Consumer	18.12(120)
Channel-2	Produce → VT → consumer	25.85(120)
Channel-3	Producer → WSM → R → consumer	9.5(120)
Channel-4	Producer → VT → LMCA → WSM → R → Consumer	14.28(120)
Channel-5	Producer → VT → WSP → R → consumer	32.16(120)

**Note:** VT- Village Trader, WSM- Wholesale Market, R- Retailer, LMCA- Local Market Commission Agent.

(Table 5), indicated that the highest 32.16 percent of bottle gourd growers sold their produce through channel no-5 followed by 25.85 percent through channel-2. It has been observed that Village Traders play an important role in vegetable marketing in the district (channel no-2, 4 and 5). Most of the farmers growing bottle gourd preferred village traders as an intermediary because of the facilities like assembling, packing, lifting from the farm gate and even financial help received from them by the farmers when they need. Only 9.5 percent of bottle gourd farmers sold their produce through channel-3 and channel-1 which is a direct channel without middleman was preferred by 18.12 percent.

**Table 6: Marketing Channels for Tomato**

Channels	Marketing Channels	Percentage of Farmers Adopting the Channel
Channel-1	Producer → Consumer	13.63(120)
Channel-2	Producer → VT → consumer	18.29(120)
Channel-3	Producer → WSM → R → consumer	12.54(120)
Channel-4	Producer → VT → LMCA → WSM → R → Consumer	17.27(120)
Channel-5	Producer → VT → WSP → R → consumer	22.68(120)
Channel-6	Producer → LMCA → R → consumer	13.59(120)

**Note:** VT- Village Trader, WSM- Wholesale Market, R- Retailer, LMCA- Local Market Commission Agent.

(Table 6), indicated that 22.68 percent of tomato growers sold their produce through channel no-5 followed by channel no-2 which was adopted by 18.29 percent of farmers. It has been observed that Village Traders play an important role in vegetable marketing in the district (channel no-2, 4 and 5). Most of the farmers growing tomato preferred village traders as an intermediary because of the facilities like packing, storage, lifting from farm gate and even financial help received from them by the farmers when they need. Only 12.54 percent and 13.59 percent of farmers sold their produce through channel-3 and 6 respectively, and channel-1 was followed by 13.63 percent of the tomato growers.

**Table 7: Marketing Channels for Cabbage**

Channels	Marketing Channels	Percentage of Farmers Adopting the Channel
Channel-1	Producer → consumer	21.33(120)
Channel-2	Producer → VT → consumer	28.24(120)
Channel-3	Producer → WSM → R → consumer	34.10(120)
Channel-4	Producer → VT → LMCA → WSM → R → consumer	16.47(120)

**Note:** VT- Village Trader, WSM- Wholesale Market, R- Retailer, LMCA- Local Market Commission Agent.

In case of cabbage, four marketing channels were identified of which channel-4 included more numbers of intermediaries. (Table 7), indicated that the highest 34.1 percent of cabbage growers sold their produce to the Wholesaler through channel no-3 followed by 28.11 percent through channel-2. It has been observed that Village Traders play an important role in vegetable marketing in the district (channel no-2 and 4). Most of the farmers growing cabbage preferred wholesaler as an intermediary or wholesale market because of the facilities like assembling, packing, handling, Freshness, storage, lifting from farm gate and even financial help received from them by the farmers when they need also Bhardwaj Sunil *et.al* (2008) found in his study that as the Indian population is increasing, the demand for fresh fruits and vegetables is also increasing. Owing to the perishable nature and very short shelf life, these items require storage and transportation facilities in order to reach to the customer in the fresh state. This requires a considerable amount of effort from the

involved parties. The entire chain is fraught with issues like lack of transparency in pricing (at the farmers' end), a dominance of traders, weak links in a supply chain, etc. Only 21.33 percent of cabbage farmers sold their produce through channel-1 which was the direct channel.

## DISCUSSIONS

The study indicated that farmers followed generally long chain in the marketing process and Agarwal Shivani (2017) also found in his study that the demand for fresh fruits and vegetables is growing year-by-year, with greater potential for the future. Agri-food produces from the farmer's field reach the end consumer through a long chain of intermediaries such as farmers/growers, cooperatives, wholesalers, retailers, commission agents, etc. supply chain planning of fruits and vegetables in agri-food supply chain is characterized by poor collaboration among the supply chain partners, huge post-harvest losses due to lack of proper infrastructure and cold chain facilities, a large number of market intermediaries leading to a fragmented supply chain, lack of information sharing among farmers and retailers, improper monitoring leading to poor quality of the produce reaching the consumer owing to the perishable nature of the fruits and vegetables and short shelf life, poor knowledge of farmers and lack of new farming practices and technology. Rais. M. (2015) also found in his study that 30 – 40 percent of fruits and vegetables are wasted due to post-harvest losses shows the estimated waste percentages in each step of the food supply chain in India which is the cause of low availability of fruits and vegetables for consumers and the need for import of them in spite of India being second largest producer. There is lack of basic as well as specialized infrastructure such as cold storages, reefer vans, cool chains, ripening chambers etc.

## CONCLUSIONS

The study indicated that Agri-food Supply chain management involves all the activities in managing the relationships between the businesses and the chain partners involved in the efficient production and supply of products from the farm to the consumers with the objective to meet consumers' requirements reliably regarding quantity, quality, and price. The chain partners may include farmers, producers, growers, retailers, farmer cooperatives, wholesalers, distributors and other intermediaries involved in supplying the Agri-fresh produce from farm to fork. As the two markets viz. Kharupetia and Besimari are the important vegetable trading centers not only for the Darrang district but also for others part of the state, hence the identified problems need to be tackled through appropriate policy measures. Village trader plays an important role in the vegetable marketing in the district and most of the vegetable growers preferred village trader as their intermediary because of the facilities like weighing, packing, storage, lifting from the farm gate and even financial help when they need. If these facilities could be provided to the farmers through an organized marketing system and institutional finance then the farmers would be able to earn more amount of the producer's share. Cheaper, faster transportation should be made available to cut down the time of transition for the vegetable producers and middlemen. Proper storage facilities for vegetables should be created in the two markets viz. Kharupetia and Besimari markets considering the volume of wholesale and retail transactions. Also, Negi *et al.* (2015) found in his study that the inefficient supply chains with inadequate cold chain facilities, lack of coordination between the supply chain partners, resulting in the post-harvest losses and wastage during transit, and the poor quality of products reaching the consumers were the major issues identified in the study. To strengthen supply chains of fruits and vegetable sector in India Some specific minimum prices should be declared for vegetables to ensure benefit for the producers.

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